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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/388,567	09/02/1999	HOWARD E. RHODES	303.593US1	4170

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EXAMINER	
MITCHELL, JAMES M	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 10/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/388,567	RHODES, HOWARD E.	
	Examiner	Art Unit	
	James M. Mitchell	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-13,15-17,23-30,48-54,57 and 58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-13,15-17,23-30,48-54,57 and 58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to applicant's arguments filed June 27, 2005.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3-8, 11, 15-17, 23-30 and 48-54, 57-58 are rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. (US 6,069,066).

4. Huang (Fig 2A-F) discloses a conductive structure and interconnect comprising a trench having a depth and width, the depth being greater than a critical depth (via sum of bottom layers), a number of metal layers (208,210, 212; Fig 2C) above the trench (206); wherein at least one of the number of metal layers is fabricated from copper (Col. 2, Lines 39-41) having a thickness; wherein said width is greater than the critical width (via more than twice the sum of sidewalls, 208, 210); and each number of metal stacked layers is planarized by CMP (Col. 2, Lines 56-59); alternatively a narrow first trench (205) having a top and depth greater than a critical depth (via sum of thickness of 208) and a width less than a sidewall width of a first metal (210), and electrically coupled to a wide, second trench or depression (206' Fig. 2C) having a depth greater than a second

critical depth and a width greater than twice the side wall width of the first metal (210) and less than twice a sidewall width of an Al second metal (212; Col. 2, Lines 50-55)) with the first and second metal deposited on the first and the second trench and the second trench is planarized to the top of the first trench; said second trench with a second width greater than the width (assumed to be critical width) with one of the plurality of metal layers coupled to the metal layer (via layers stacked); such that the Al is inherently coupled to the copper (via layers stacked); wherein the second trench has a Ti/TiN barrier layer (Col. 2, Lines 46-48) and a copper layer that covers the barrier layer and therefore is over said barrier; wherein one of a plurality of metal layers forms highly reliable bond to gold wire (Col. 3, Lines 28-30); with a wide trench/ depression having a second depth equal to the narrow trench depth that is greater than the critical depth (greater than summation of barrier layers); and with the first and second trenching having a plurality of metal layers coupled As for applicant's contention there is no teaching of coupling a metal layer in a trench (Fig. 2C),

5. With respect to the process limitation[1] of claims 1, 6 and 7 such as "the number of metal layers is determined by the width, or "the number of metal layers... is a function of the width and critical width," the prior art structure is the same as the claimed invention. "[E]ven though product-by-process claims are limited by and defined by the process; determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is

unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

6. In regards to the limitations that recite "capable of" for example "stack layers capable of defining a critical width," "layers is capable of being increased as the width increases," or "layers capable of forming...eutectic bond..." Huang's structure is capable of performing these intended use limitations. Furthermore, it has been held that an element is "capable of" performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In re Hutchinson, 69 USPQ 138 (CCPA 1946).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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[1] In a product claim, the technique/process used by applicant to determine how great his width or depth should be is in material, where the prior art discloses the same structure.

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 14, 55, 56, 59 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang (US 6,069,066) in combination with Lin et al. (U.S. 6,551,916)

10. Huang discloses elements of paragraph 3 and further that one of the plurality of metal layers is bonded to highly conductive, gold wire ("line"; Col. 1, Lines 58-60) and planarized layers (Fig 2D) with a second trench with a width greater than the width, but does not appear to disclose a wire bond coupling a conductive material to at least one of the plurality of metal layer or that the aluminum layer is an alloy.

11. With respect to claims 14 and 56, aluminum alloy comprising Al-Cu or Al-Si-Cu or a Gold alloy are known materials in the art for providing interconnect/pads. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an aluminum alloy pad or gold alloy wire to functionally equivalent interconnect, since it has been held to be within the general skill of a worker in the art to select known material on the basis of its suitability for the intended use as a matter of design choice. In re Leshin, 125 USPQ 416 (1960).

12. With respect to the process limitation of "wire-bonded" in claim 60, the prior art structure is the same as the claimed invention. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product

was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

13. Claims 9, 10, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang in combination with Ooishi (US 6,208,547).

14. Huang discloses the elements stated in paragraph 3, but does not explicitly disclose that one of the number of metal stack layers couples a first logic device to a second logic device or in the alternative a first and second memory cell.

15. Ooishi (Fig 13) utilizes either a first and second logic or memory cell coupled by an interconnect (3006,1200; Abstract; Col. 3, Lines 22-35).

16. It would have been obvious to one of ordinary skill in the art to incorporate the contact structure of Huang with the logic/memory interconnect structure of Ooshi in order to provide a contact structure as required by Ooishi (36006 and n1200) and that is free form oxide as taught by Huang (Col. 1, Lines 66-67).

Response to Arguments

17. Applicant's arguments filed June 27, 2005 have been fully considered and are not persuasive.

Per applicant's request, examiner acknowledges that claim 58 was indeed rejected in the prior office action as indicated by applicant. The office action summary merely contained a typographical error, omitting claim 58. However, the claim was addressed in the prior office action as concurred by applicant. The gravamen of applicant's argument is that allegedly examiner has not established a prima facie case,

because the prior art does not use the term "critical" in its disclosure and that the prior art does not show its trenches connected. Examiner disagrees. Contrary to applicant's assertion, the prior art need not use the term critical to anticipate the claimed invention, since applicants can be there own lexicographer. A patent is relied on for its full disclosure, including the written description, claims, drawings etc. In this instance, since Huang discloses (see office action, *supra*) applicant's critical depth or width definition, which requires for example that the trench depth or width be larger than the summation of the different layer thicknesses (for example shown in applicant' specification page 8), it anticipates the claim irrespective of if the term "critical" was used in the prior art. Therefore, since examiner has provided a prima facie case, it is incumbent for applicant to provide evidence as to why the prior art does not satisfy the claimed limitation. As for applicant's contention there is no teaching of coupling a metal layer in a trench with a layer in a second trench, examiner disagrees. Because Huang in Fig. 2C, discloses metal layers in two trenches in contact and therefore coupled, applicant's argument is deemed unpersuasive. Likewise applicant contends that Ooshi teaches away from the contact structure of Huang. This amounts to an argument based on the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Since Ooshi provides proper motivation to combine as stated *supra,* applicant's

argument is deemed unpersuasive. Lastly applicant contends that it has the right to swear behind the reference. Since applicant has not properly antedated the prior art, applicant's argument is moot. For these reasons, the rejection is deemed proper.

Conclusion

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jmm
September 16, 2005

CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
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